SATELLITES OF MARS.

DATA FOR EPHEMERIDES OF THE SATELLITES OF MARS IN THE OPPOSITION OF 1881.

By Professor Asaph Hall.

Greenw. M. Noon. Date.	Log f	F	Log g	G	Phobos u_1	Deimos u_2	Aberr.
		° ′		° ′	″	°	m
1881 Nov. 16.0	9.97946	296 3.7	9.50991	318 56.7	308.50	234.01	— 5.9
18.0	9.97948	296 2.8	9.50901	318 41.0	46.18	84.34	5.8
20.0	9.97942	296 5.3	9.50858	318 22.0	143.86	294 67	5.7
22.0	9.97928	296 11.2	9.50865	318 0.1	241.54	144 99	5.7
24.0	9.97907	296 20.4	9.50923	317 34.9	339.22	355.32	5.6
26.0	9.97877	296 33.0	9.51037	317 7.2	76.90	205.65	5.5
28.0	9.97839	296 49.1	9.51205	316 36.8	174.58	55.97	5.4
30.0	9.97792	297 8.6	9 51431	316 4.3	272.26	266 30	5.4
Dec. 2.0	9.97738	297 31.4	9.51715	315 30.0	10.95	116.63	5.3
4.0	9.97674	297 57.6	9.52055	314 54.3	107.63	326.95	5.3
6.0	9.97603	298 27.1	9.52456	314 17.8	205.31	177.28	5.2
8.0	9 97523	298 59.7	9 52910	313 41.0	302.99	27.61	5.2
10.0	9.97435	299 35.4	9.53418	313 4.3	40.67	237.93	5.1
12.0	9.97340	300 14.0	9.53976	312 28.5	138.35	88.26	5.1
14.0	9.97236	300 55.3	9.54578	311 54.0	236.03	298.58	5.0
16 0	9.97125	301 39.0	9.55218	311 21.3	333.71	148 91	5.0
18.0	9.97008	302 24.8	9.55890	310 51.0	71.40	359.24	5.0
20.0	9.96886	303 12.4	9 56587	310 23.2	169.08	209.56	5.0
22.0	9.96759	304 1.5	9.57298	309 58.4	266.76	59.89	5.0
24.0	9.96629	304 51.6	9.58016	309 36.7	4.44	270.21	5.0
26.0	9.96496	305 42.2	9.58733	309 18.1	102.12	120.54	5.0
28.0	9.96363	306 33.0	9.59441	309 2.9	199.80	330.87	5.0
30.0	9.96230	307 23.4	9.60131	308 50.6	297 48	181.19	5.1
1882 Jan. 1.0	9.96099	308 13.2	9.60800	308 41.3	35.16	31.52	5.1
3.0	9.95971	309 1.8	9.61440	308 34.6	132.84	241.84	5.1
5.0	9.95847	309 48.8	9.62047	308 30.5	230.52	92.17	5.2
7.0	9.95728	310 34.0	9.62618	308 28.5	328.21	302 50	5.2
9 0	9.95614	311 16.9	9.63149	308 28 5	65.89	152.83	5.3
11.0	9.95508	311 57.3	9.63639	308 30.0	163 57	3.15	5.4
13.0	9.95410	312 34.8	9.64084	308 32.6	261.25	213 47	— 5.5

The angle of position and the distance of the satellite, p and s, will be computed by the formulæ

$$s \sin p = \frac{a}{\rho} \cdot f \sin (F + u)$$

$$s \cos p = \frac{a}{\rho} \cdot g \sin (G + u),$$

where ρ is geocentric distance of Mars. The values of a, and of μ, the mean distances and the mean daily motions of the satellites are as follows:

Phobos.	Deimos.
$a = 12''9531$	$a = 32''3541$
$\mu = 1128°8405$	$\mu = 285°1632$

The quantity u for each satellite is given for the corresponding dates in the columns u_1 and u_2. For elongations the value of u is given by the equation

$$\tan 2u = - \frac{f^2 \sin 2F + g^2 \sin 2G}{f^2 \cos 2F + g^2 \cos 2G}.$$

Thus for Dec. 20, $u = 325°83$ at the elongation, and in the case of Deimos $s = 53\ 7$. Near the conjunctions this satellite passes within $2''5$ of the centre of the planet, and the apparent ellipse will be very eccentric. Calling the brightness of the satellites unity on October 1, 1877, the brightness of the next opposition will be as follows:

1881 Nov. 16 brightness = 0.303
Dec. 14 " = 0.399
1882 Jan. 13 " = 0.330

The brightness of the satellites on November 16 will be a little greater than when they were last observed with the 15-inch refractor of the Harvard College Observatory.

On account of the greater distances of the planet from the Earth and Sun, these satellites will be faint next December, but as the planet will be in declination + 26°, they will be within the reach of several large telescopes, and it is possible that a good series of observations may be obtained. The elongation will occur in the angles of position 68° and 248° nearly, and the satellites should be looked for carefully at such times.

After the next opposition I hope to unite the observations of 1877, 1879 and 1881 in a new determination of the orbtis.

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The absorption of ultra-violet rays by certain media is being investigated by M. De Chardonnet. One method adopted is to direct a beam through a liquid in a trough with parallel glass or quartz sides, to Poitevin's photochromic paper (which indicates by change of tint, the presence of actinic rays). In a second method, a solar beam from a heliostat is sent through a slit, an objective of quartz and Iceland spar, and a prism of the spar, to a photographic plate or fluorescent screen; then a trough half filled with liquid is put before the slit. The author finds that the liquid circulating in plants, or impregnating roots and fruits have all an avidity for chemical rays. Fluorescence does not seem to be directly related to intensity of actinic absorption; thus decoction of radish absorbs less than decoction of potatoes, yet the former is without the property, while the latter is not. White wine is weakly fluorescent; red wine does not fluoresce. Of the few animal liquids examined, blood is found a powerful absorbent; but the aqueous humour of a calf's eye, and the albumen of eggs, have no action on chemical rays. Distilled water, alcohol, sulphuric ether, collodion, and solution of cane sugar are also inactive. Gelatine intercepts all the chemical rays, and it is sensibly fluorescent.